Tools and Practices — All the Rest is a Lot

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Premises on This Presentation

- **Mostly can only point you in useful directions**
- **Will cover general resources, agency-specific, and tool-specific**
- **Practices, directives, and tools**
- **Also will touch on what key things this presenter thinks everything else misses**

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General Documents

- Whole Building Design Guide
  - (*http://www.wbdg.org*)
- Sustainable Federal Facilities: A Guide to Integrating Value Engineering, Life Cycle Costing, and Sustainable Development, FFC, 2001
  - (*http://books.nap.edu/books/0309072999/html/index.html*)
- LEED, Version 2.1.
  - (*http://www.usgbc.org/ and follow the links)*
- Buying Energy Efficient Products
  - (http://www.eren.doe.gov/femp/procurement)
- OMB Circular A-11
  - (*http://www.whitehouse.gov/omb/circulars/a11/02toc.html)*

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General Stuff cont'd

- **You can find sustainability documents all over the internet**
  - **DOE programs, e.g., Rebuild America (*http://www.rebuild.gov*)**
  - **States, cities, counties, school districts**
- **Search Internet using "sustainable new building design" and your favorite other**
  - **1000's of sites**
- **Sustainable? Green? High-Performance?**

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Panoply of Tools

- **LEED, SPiRiT, BEEs, Energy Star, BREEAM, GBTool, LCA tools (e.g. ATHENA, ENVEST), . . .**
- **ASHRAE Stds, ISO Stds, ANSI Stds, . . .**
- **Unpublished tools**
- **Proprietary tools**
- **Energy and environmental tools**
- **Occupancy evaluation tools**

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Army SPiRiT

- **Dept directive from DAIM, May 4, 2001**
- **Corps of Engineers directive, June 2001**
- **Use SPiRiT for sustainable design**
  http://www.usace.army.mil/inet/usace-docs/eng-tech-ltrs/etl1110-3-491/
- **Instill sustainable design and development into all activities**
- **SPiRiT supposed to blend into LEED 3**

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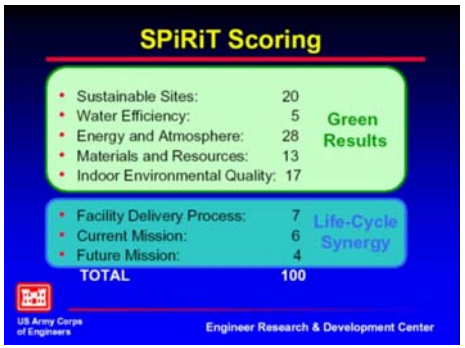

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Army, USACE, ERDC, CERL

- **Sustainable Design And Development Resource**
  http://www.cecer.army.mil/sustdesign/
- Lots of info and links, FAQs
- Support for process
- Info updates
- Related resources

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Navy NAVFAC

- Sustainability policies June 1998
- "LEED-like" adopted, July 2002
  - Self-assess to LEED Silver required
  - Push toward use of non-military standards
  - Federal and other related regs considered to be met by compliance with LEED
- 2003, policy still working its way through the system but definitely being felt

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Air Force

- Sustainable Facilities Guide, 2001
- Sustainability policy, Dec 2001
  - LEED is preferred self-assessment metric
- Sustainable Development Toolbox
  - http://www.afcee.brooks.af.mil/green/resources/toolbox/TOOLBOX.asp

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GSA

- 2000 / 2001 — Sustainable, High-Performance Workplaces a priority
- 2002/2003 — LEED certification a goal
- Longer-Term goal — LEED Silver
- High-Performance Workplace research ongoing

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Dept of Energy

- http://www.sustainable.doe.gov/ (communities)
- Interagency sustainability task group
- High-performance buildings
  http://www.eere.energy.gov/buildings/highperformance/
- Contributes to USGBC
- Supports ABSIC, SBIC, etc

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Dept of State

- If security is your issue, some interesting activities at State, as they struggle to upgrade embassies worldwide
- Blast resistance
- Chem / bio filtration
- On the bleeding edge in some areas

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BREEAM Environmental Assessment Method

BREEAM

- http://www.breeam.com/
- The Environmntal Assessement Consortium - EAC
  - registered BREEAM consultants
- Possibly most widely-used method worldwide
- Simple, but somewhat subjective

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BREEAM: 3 sets of issues

- Two parts: Building Envelope and Systems, and Operation and Management
- Issues for both parts have the same major categories:
  - Global Issues
  - Local Issues
  - Indoor Issues
- Before and After approach, occupied state

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Energy Star Buildings

- EO 13123 directs agencies to "strive" to have facilities become certified
- Only truly empirical energy efficiency certification
- Five building types: office, hospital, hotel/motel, grocery, K-12 school
- Rating tool also required to be integrated into facility audit procedures, EO 13123

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Energy Stars

- www.energystar.gov
- No reason not to use for new buildings, but it requires that
  - TOTAL energy use must be estimated
  - Estimates must be reasonably accurate
- DOE-ORNL has unpublished rating tool that will handle most facilities — even large campuses

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ASHRAE

- Std 90.1 and 62.1 govern energy systems and indoor air quality in a lot of places
- Guideline 18 was supposed to provide more "advanced" energy options, but this Guideline was derailed en route
- New Special Project 102 will work to develop an advanced energy approach that is 30% beyond 90.1
- New SP 101 will aim for 50% beyond

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Major Common Energy System Issues

- Daylighting is still not addressed acceptably in almost all cases, and if used the energy benefits are often negated
- Lighting still suffers in many cases
- The major innovation in HVAC occurring internationally at this time is splitting the V from the HAC, but only minor recognition in this country
- Controls continue to remain inadequate to awful in too many cases

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Design Energy Performance Can Be Specified as Energy Rating

- One sentence spec and exception to regs and standards covers all that is needed
- SPEC: Total building energy use will allow Energy Star certification
- EXCEPTION: Energy Star will meet or exceed all other regs, etc
- Require end-use breakout estimate, forces care
- Has to be a rating system available for the building type

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Daylighting

- Large energy benefits typically not harvested, 25–40% of lighting energy
- Designers typically not aware, codes often against glazing
- 6–10 key design elements, from orientation and space use to controls, all must be OK to be successful

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Lighting

- Standards and regs usually out of date, continually trying to catch up
- Designs usually boring, and inefficient, as a result
- Centralized switching or control of office spaces a disaster, use occupancy sensing
- Eliminate HID as much as possible, and use person-sensing as much as possible
- Start to link security to sensing of “critters”

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HVAC

- Split the ‘V’ from HAC, but not necessarily completely

- Functions of IAQ, pressurization, exhaust, etc, are complicated and important
- HVAC cannot work psychrometrically, 50 years out of date
- Occupancy sensing and occupant control are critical

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HVAC Issues

- VAV is NOT OK for offices and many other types of spaces, OK for 100% outdoor air
  - Range of documented problems is staggering
  - Makes for lazy zoning in design
  - Energy use is 20–25 kBtu/sq-ft higher, average
- Airside economizers should not be used, esp in the South — not possible if ‘V’ removed
  - Range of problems again staggering
  - Pit for O&M dollars, space quality perverter
  - Enthalpy recovery or heat recovery instead

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HVAC and Space Quality

- **IAQ quality demands separate IAQ / space pressurization system, and enthalpy recovery becomes more possible**
- **Thermal quality demands small zones and small HAC units for many space types, keep fan pressure and flows down**
- **O&M has to balance HAC unit size, but paradigm of pull and R/R changes game**
- **"Plug-in" racks in the future?**

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Space Quality and Design, Basics

- **LEED says "Views," but a "window" is where the space quality starts, an operable window raises the stakes**
- **The #1 complaint in offices is that the heating and cooling do not work (90% of buildings) — why continue the misery?**
  - **Occupant control critical in most cases**
  - **Occupant sensing the best O&M strategy to have best control**
- **Control of effluents rounds out the basic package**

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Controls

- **Let occupancy and presence sensing do most of the work — simplify, simplify, simplify**
- **Simplify the V and HAC so controls are easier**
- **Verification on daylight sensing still needed**
- **Otherwise pay the price of trying to overpower systems with control, and figuring out what the controls are doing**

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. . . And in the End . . .

- **Buildings of tomorrow will depend critically on our ability to assess the in-use performance of today's buildings**
  - **High-performance metrics needed**
  - **Assessment methods needed**
- **LEED is awkward for buildings in use (existing)**
- **Energy Star, BREEAM, ANSI/MSE 2000 offer ways to assess buildings in use**
- **But more breadth and empiricism still needed**

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